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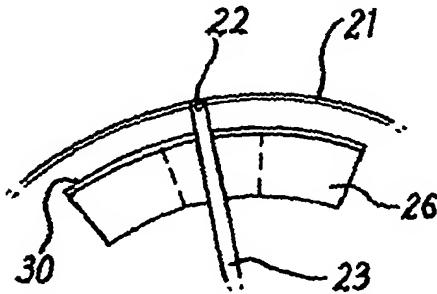
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(54) Title: ENTERTAINMENT MACHINES

(57) Abstract: A display device for a player-operable entertainment machine has a rotatable reel (9) with symbols around its periphery. The symbols are defined digitally on a support (27, 30), such as a curved LCD strip, by feed of signals from a signal generating device (28). The support (27) may rotate with the reel. Alternatively the support (30) may be fixed so that the reel (9) rotates but the support (30) is static. In this case the support (30) extends round part only of the periphery of the reel and the feed of signals is such as to define symbols which move with the rotation of the reel (9).



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ENTERTAINMENT MACHINES

This invention relates to player-operable entertainment machines, particularly coin-operated amusement with prizes (AWP) machines, such as "fruit" or "poker" machines of the kind having a main display device for displaying a selected combination of symbols at a win zone. As used herein the term coin is intended also to cover tokens, charge or credit cards or any other means of supplying credit or monetary value.

The main display device of a fruit machine may comprise multiple (usually three or four) side-by-side reels which are rotatable about a common horizontal axis within a housing behind a window at the win zone. Each reel has symbols at equally spaced positions (typically 20 positions) around its periphery and the reels can be brought to rest with one symbol on each reel displayed through the window on one or more so called win lines.

If the displayed symbols constitute or include a predetermined winning combination an award may be made available to the player.

In one well known arrangement, the symbols comprise representations of different fruits and also special (e.g. jackpot) symbols, such as the number 7, a picture of a bar or the like. Some of the symbols may be overprinted with, or otherwise accompanied by additional indications, such as indications corresponding to transfer of play to a supplementary feature game or corresponding to some other special feature or bonus.

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The nature and frequency of occurrence of the symbols are selected for the reels depending on the particular machine game and requirements with regard to win likelihood, pay-out percentages and the like.

5 It is well known to use standardised reel mechanisms for different machines and differences in the symbols may be accommodated by using different reel bands in the form of printed plastics bands removably attached around the peripheries of the reels.

10 It is usual to provide back illumination for the symbols with lamps housed in the reels and accordingly the reel bands may be made from translucent or transparent plastics material.

15 The use of attached, printed reel bands is generally inconvenient and restrictive. It means that different symbol combinations require printing of different reel bands, and changes cannot readily be implemented to existing operational machines. Also, reliance on printing limits the ability conveniently to incorporate and change special visual effects.

20 As an alternative to mechanical reels with attached reel bands it is well known to use video-simulated reels. This permits ready set up and subsequent change of symbols and permits easy incorporation of special visual effects, but simulated reels are not always as acceptable to players as mechanical reels.

An object of the present invention is to facilitate the provision of

different combinations or variations of symbols on mechanical display devices.

According to one aspect of the invention therefore there is provided a display device for displaying symbols in a player-operable entertainment machine comprising at least one movable member having a symbol-bearing support, and a signal-generating device characterised in that the support is a signal-actuable support whereby the symbols are produced on said support by supply of signals thereto from said signal-generating device.

With this arrangement instead of requiring a specially printed reel band it is possible to use a standardised reel and support and then produce the desired symbols by appropriate signal-actuation of the support. Initial set up and possibly also subsequent change of the symbols can thereby be much facilitated and special visual effects can be readily incorporated.

With regard to the support this may be capable of actuation, to produce the symbols, by application of any suitable signals thereto of an electrical, electromagnetic, magnetic or other nature such that the symbols are created in correspondence with characteristics of the signals.

The signals are preferably of the form of electrical charges or currents whereby the symbols are created in correspondence with applied patterns or sequences of the signals.

In a particularly preferred embodiment the support comprises an

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LCD substrate which creates the symbols in correspondence with applied digital signals. Other devices such as OLED devices can also be used.

The arrangement may be such that the symbols are produced after actuation of the support and are retained without need for further 5 actuation. Alternatively, continuous or continual actuation may be necessary whereby the symbols are only produced and displayed whilst the actuation is maintained.

Thus, as appropriate, the signal-generating device may be operable to produce and maintain actuating signals and/or to produce actuating 10 signals to establish the corresponding symbols at an occasion, e.g. at a power-up occasion, the signal-generating device then ceasing operation leaving display of the symbols maintained by virtue of retentive properties of the support alone and/or by supply of power to the support to effect retention.

15 Alternatively, in the case where the support has retentive properties (alone or in dependence on supply of power) the support may be pre-actuated whereby the signal-generating device may be used only at set up.

20 The signal-generating device may be adapted to operate in a plurality of pre-determined modes corresponding respectively to a plurality of pre-determined different symbol combinations or variations. Alternatively or additionally provision may be made for adaptation of the signal-generating device at will to produce different symbol combinations

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or variations as desired, possibly within defined limiting parameters,

Alternatively or additionally the signal-generating device may operate automatically to change the symbols on any suitable predetermined random or pseudo random basis between or during play as a consequence of game play parameters, selections or events and/or as a consequence of other non-game related parameters.

Where the signal-generating device has different modes or can be adapted at will, switching between the different modes or the entering of data or instructions at will, thereby to change the displayed symbol combination, may be achieved in any suitable manner, e.g. by operating manual controls such as switches, press buttons, a touch screen, or a keyboard, and/or by selection or substitution of all or part of stored data on a data store medium such as a CD-ROM, EPROM or the like.

Implementation of these changes may be made available to any user, or only to an authorised user, or only at a manufacturing stage.

In the case where the signal generating device operates to change the symbols on an automatic basis this may be under the control of control circuitry of the entertainment machine or otherwise e.g. by a remote control device.

The movable member may take any suitable form. In one embodiment the member is a rotatable member particularly an axially rotatable reel or drum. In the latter case the support may be in the form of a flexible or pre-shaped strip mounted in a curved path around or

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alongside all or part of the outer periphery of the reel or drum so as to face radially outwardly.

In a particularly preferred embodiment the movable member is a rotatable reel of a player-operable coin-operated entertainment machine, especially an amusement with prizes machine or a fruit machine of the kind described above. Thus, the display device of the invention may comprise the main display device of a fruit machine whereby the display device may comprise multiple side-by-side axially rotatable reels each having a respective said signal-actuable support applied thereto.

The invention is not restricted to movable members in the form of rotatable reels. Other kinds of movable members may also be used such as a rotatable disc with the support on a face of the disc, wheel or roller drives operable to drive a flexible bands, which may be wholly or partially defined by the said signal-actuable support, around a closed path or loop, or the like.

The invention is not restricted to application of the main display device of a fruit machine. For example, it is usual for fruit machines to incorporate one or more auxiliary reels for supplementary features such as feature games, gamble features or the like and the display device of the invention may also be used for such reels.

Where used in a fruit machine, the aforesaid change of adaptations may be achieved by operation of external player controls, and/or by internal user controls or selections accessible only to authorised

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personnel, and/or remotely via a communication link from a nearby control device or from a remote central control location or otherwise, and/or in accordance with pre-determined or random or pseudo-random scheduling whereby changes take place on a predetermined, random or pseudo random basis which is time-determined or triggered by any other suitable event and/or in accordance with game play selections, events or features.

If desired the support may be illuminated in any suitable manner e.g. by back-lighting, reflection or as a consequence of actuation of intrinsic light-producing properties of the support.

10 The symbols may take any suitable form as required. Thus, the symbols may comprise pictorial representations of fruit special jackpot symbols, numbers, currency values, transfer symbols, etc.

15 The signal-actuable support may be applied to the movable member so as to be movable therewith. Alternatively, the support may be applied to the movable member so that the support is static and the member moves relative to the support, signal-actuation of the support being arranged to produce a moving symbol display simulating movement of the symbols together, and preferably in synchronism with the movable member. By way of example, the movable member may comprise a reel 20 with the support mounted inwardly of, and exposed through, an openwork or skeletal reel rim; or it may comprise a reel with the support mounted outwardly of and exposed alongside a peripheral edge or edges of a reel rim. The support need only be of a size appropriate to the

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display zone. That is, for a reel rotatable behind a window such as to display say three symbols, the support need only consist of a corresponding arcuate length.

Thus, and in accordance with a second aspect of the invention
5 there is provided a display device for a player-operable entertainment machine comprising at least one movable member arranged to bear symbols for display on the machine, and a signal-generating device, characterised by the provision of a signal-actuable support mounted alongside said member so that the member is movable relative to the
10 support and the symbols are arranged to be produced on said support in a sequence moving in correspondence with movement of the member by supply of signals to the support from the signal-generating device.

With this arrangement, although movement of the symbols is only simulated, such movement is accompanied by movement of the member
15 whereby a display corresponding closely to a moving symbol-bearing member is attained.

This second aspect of the invention may incorporate any or all of the hereinbefore described features.

Whilst the association of the support with a movable member is
20 preferred, it may also be possible to use a signal-actuable support which is preferably static and not necessarily associated with any movable member but is shaped physically to conform to a simulated path of movement. In the case of simulated reel rotation behind a window, the

support may comprise a curved section.

Thus and in accordance with a third aspect of the invention there is provided a display device for a player-operable entertainment machine comprising a signal-actuable support, and a signal-generating device, 5 characterised in that the support is shaped to conform to a simulated path of movement and the symbols are arranged to be produced on said support in a sequence moving along said path by supply of signals to the support from the signal-generating device.

With this arrangement, although movement of the symbols is only 10 simulated, such movement takes place along a physically shaped path e.g. a curved path and thereby simulates more closely mechanical movement.

This third aspect of the invention may incorporate any or all of the hereinbefore described features.

15 The invention will now be described further by way of example only and with reference to the accompanying drawings in which:-

Figure 1 is a diagrammatic perspective view of one form of a fruit machine according to the invention;

Figure 2 is a diagrammatic block circuit diagram of the machine of 20 Figure 1; and

Figure 3 is a perspective view of one form of a display device of the machine;

Figure 4 is a side view in detail of Figure 3; and

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Figure 5 is a view similar to Figure 4 of an alternative embodiment.

Referring to the drawings, Figure 1 shows a fruit machine having a floor-standing box shaped housing 1 having a front wall which includes upper and lower glass panels, 2, 3, a number of operating buttons 4, 5, 6, a coin slot 7 and a payout opening 8.

Within the housing 1 there are three axially aligned reels 9 having say 20 symbols at regularly spaced positions around their peripheries. The reels 9 are axially rotatable and are drivably connected to respective stepper motors 10. The reels 9 are arranged behind a window 11 defined by a printed region of the lower glass panel 3. Each reel 9 can be arrested by the respective stepper motor 10 in any of 20 stopping positions in which one symbol is in precise registration with a horizontal win line in the centre of the window 11 and two further symbols are visible above and below the win line.

The stepper motors 10 are connected to a microprocessor-based control unit 12. This unit is also connected to a coin-mechanism 13, a pay-out mechanism 14 and the buttons 4, 5, 6.

In use, the player inserts coins into the coin mechanism 13 through the slot 7 sufficient to generate credit for one or more games, and the machine is actuated so that a game can now be played. The game commences after a start button 4 has been pressed and the reels 9 spin and then come to rest so as to select a combination of symbols displayed on the win line. The displayed symbol combination is assessed by the

control unit 12 and a win indication is given in the event that the combination is of a predetermined winning nature.

The control buttons 5 can be used to perform 'hold' or 'nudge' functions, when made available to the player, so that the player can seek 5 to influence the outcome of a game, in conventional manner.

The upper panel 2 is a transparent glass panel and within this there is a printed display region 15, which can be back-illuminated with a bank of lamps, and which provides a supplementary feature game.

This feature game may comprise a wraparound trail and a rotatable 10 auxiliary feature reel 19 is visible through a window in the panel 2.

Play transfers to the feature game in the usual way on a random or predetermined basis, e.g. when predetermined transfer symbols on the main reels 9 are selected on the win line or otherwise.

As shown in Figure 3, each of the reels comprises a drum-shaped 15 plastics skeletal framework 20 having two circular rims 21 linked by transverse ribs 22 at spaced intervals around the rims and radial arms 23 extending inwardly from one of the rims to a central hub 24.

The hub 24 is connected to a stepper motor 10 mounted on a support foot 25.

20 This foot also carries an arcuate light box 26 (shown in Figure 4 but omitted from Figure 3) with three, successive sections containing lamps. The light box 26 is disposed between the rims 21 slightly inwardly of the ribs 22.

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The reel structure so far described is conventional and would normally be completed by a translucent plastics reel band fixed between the rim 21 around the entire periphery of the reel on top of the ribs 22. This reel band is conventionally printed with symbols, such as pictures of fruits etc., at say 20 equally spaced positions. Symbols on the band can be selectively back-illuminated with the light box 26 in the window 11.

In accordance with the described embodiment of the present invention, the reel band is replaced by a similarly sized flexible LCD strip 27.

10 The strip 27 has edge connectors and is linked by a commutator or other linking arrangement (not shown) to a signal generating device 28 connected to the control unit 12.

15 The signal generating device 28 is operated to generate patterns or sequences of digital signals which cause symbols to be produced in colour at 20 equally spaced positions around the LCD band. The band 27 is translucent whereby the symbols are backlit by the light box 26.

The signals may be predetermined, in accordance with data contained in a data storage device 29 connected to the control unit to produce a predetermined sequence of symbols of predetermined kinds.

20 The machine can therefore be readily set up to provide a desired symbol sequence using a wholly standardised reel mechanism by appropriate selection of stored data.

The arrangement may be such that the utilised data, and hence the

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substitution of a different data store 29 (e.g. EPROM or the like) and/or by switching between different resident data stores, or different sections of a single such resident data store. This changing may be achieved during a machine set up procedure by authorised personnel who have access to the interior of the machine and/or to protected control devices such as switches, remote connections or the like. Thus it may be possible to change the symbol sequence from a remote control station via on-line, Internet or other remote link.

Alternatively or additionally there may be provision for changes to be made by a player. Thus by use of machine controls 4, 5, 6 the player may be able to change games or game play options by selection from available ranges and this may automatically change, in corresponding manner, the symbol sequences e.g. to change the nature of the symbols or the frequency of individual symbols of the like.

Alternatively or additionally changes may take place automatically in correspondence with events. Thus, symbols may change on a random, pseudo random or predetermined basis with parameters such as elapse of time, number of plays, periods of inactivity, or during play to enhance playing of a game by increasing variety or to reward a successful outcome of a game play feature, or otherwise.

These automatic changes may be of a substantive nature i.e. such as to effect or correspond to a changed game play feature, or of an entertaining nature e.g. to give an interesting visual effect or the like.

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With the embodiment of Figure 5, instead of using a movable LCD strip 27, a short strip 30 is fixed over the light box within the periphery of the reel 20 so as to follow a curved path of similar diameter to that of the drum periphery, and signals are fed to the LCD strip to simulate movement of symbols through a predetermined sequence in correspondence with rotation of the drum structure 20.

Thus, when the drum structure 20 is static, three symbols are defined on the strip 30 and displayed statically through the window 11 to the player.

When the drum structure 20 rotates the displayed symbols change in simulation of rotation at the same rate as the drum structure. The player thereby sees the real rotation of the drum structure and the simulated movement of the symbols along the curved path of the strip 30. This represents very closely the appearance of a wholly mechanical reel.

If desired there may be an additional transparent or translucent band around the reel through which the symbols can be seen.

The symbol sequence may be changed as described above in relation to the first embodiment.

With the embodiments described above symbols can be installed and changed in a particularly convenient and flexible manner without departing unduly from the desirable mechanical reel appearance.

It is of course to be understood that the invention is not intended

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to be restricted to the details of the above embodiment which are described by way of example only.

CLAIMS

1. A display device for displaying symbols in a player-operable entertainment machine comprising at least one movable member (9) having a symbol-bearing support (27, 30), and a signal-generating device (28) characterised in that the support is a signal-actuable support (27, 30) whereby the symbols are produced on said support by supply of signals thereto from said signal-generating device (28).
5
2. A display device according to claim 1 characterised in that the movable member (9) is movable relative to the support (30), and the signal-generating device (28) is operable to produce a moving symbol display on the support (30).
10
3. A display device for a player-operable entertainment machine comprising at least one movable member (9) arranged to bear symbols for display on the machine, and a signal-generating device (28), characterised by the provision of a signal-actuable support (30) mounted alongside said member (9) so that the member (9) is movable relative to the support (30) and the symbols are arranged 15 to be produced on said support (30) in a sequence moving in correspondence with movement of the member (9) by supply of signals to the support from the signal-generating device (28).
20
4. A display device according to claim 1 characterised in that the support (27) is movable with the movable member (9).

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5. A display device according to any one of claims 1 to 4 characterised in that the movable member (9) is a rotatable member..
6. A display device according to claim 5 characterised in that the 5 rotatable member (9) is an axially rotatable reel, and the support (27, 30) is in the form of a strip mounted in a curved path relative to at least a part of an outer peripheral structure (21, 22) of the reel so as to face radially outwardly therefrom.
7. A display device according to claim 6 when dependent on claim 2 10 or 3 characterised in that the strip (30) extends around part only of the peripheral structure (21, 22).
8. A display device according to claim 7 wherein the peripheral structure (21, 22) is open whereby the strip (27, 30) is visible therethrough.
- 15 9. A display device for a player-operable entertainment machine comprising a signal-actuable support (30), and a signal-generating device (28), characterised in that the support (30) is shaped to conform to a simulated path of movement and the symbols are arranged to be produced on said support (30) in a sequence moving 20 along said path by supply of signals to the support from the signal-generating device (28).
10. A display device according to any one of claims 1 to 9 characterised in that the support (27, 30) comprises an LCD

substrate and said symbols comprise digital signals.

11. A display device according to any one of claims 1 to 10 characterised in that the signal-generating device (28) is operable to produce and maintain said signals thereby to establish and maintain
5 said symbols.
12. A display device according to any one of claims 1 to 10 characterised in that the signal-generating device (28) is operable to produce said signals thereby to establish said symbols, the support (27, 30) being operative to retain established symbols.
- 10 13. A display device according to any one of claims 1 to 12 characterised in that the signal-generating device (28) is operable in a plurality of modes corresponding respectively to a plurality of different symbol ranges.
14. A device according to any one of claims 1 to 13 characterised in
15 that the support (27, 30) is back illuminated with an illumination device (26).
15. A device according to any one of claims 1 to 14 characterised in that the symbols on the support (27, 30) comprise pictorial representations of fruit.
- 20 16. A player-operable coin-operated entertainment machine of the kind having a main display device for displaying a combination of symbols at a win zone, said device comprising a plurality of side-by-side symbol-bearing reels (9) rotatable about a common

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horizontal axis within a housing behind a window at the win zone, characterised in that said main display device is the display device of any one of claims 1 to 15.

17. A player-operable coin-operated entertainment machine of the kind

5 having a main display device for displaying a combination of symbols at a win zone, and an auxiliary display device (19) for displaying one or more symbols in relation to a supplementary game feature characterised in that said auxiliary display device is the device of any one of claims 1 to 15.

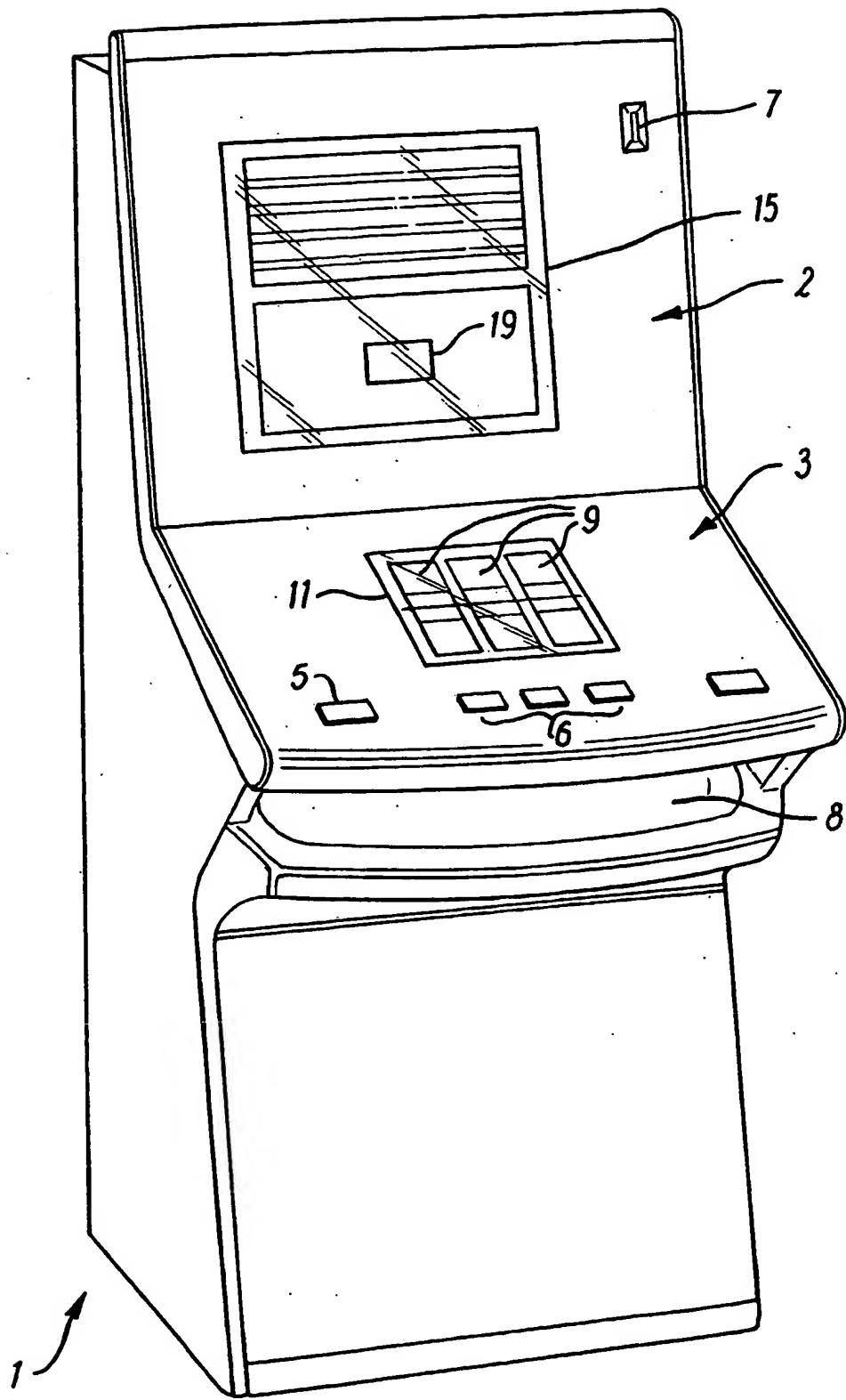


FIG. 1

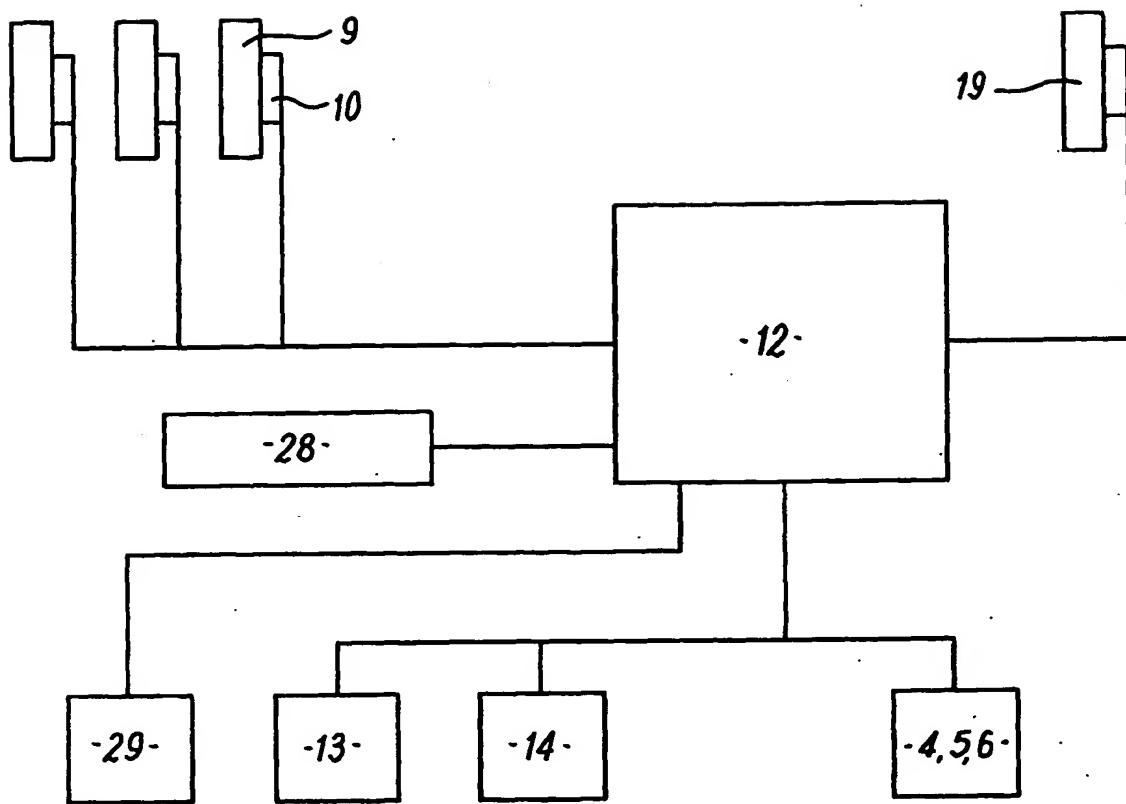


Fig. 2

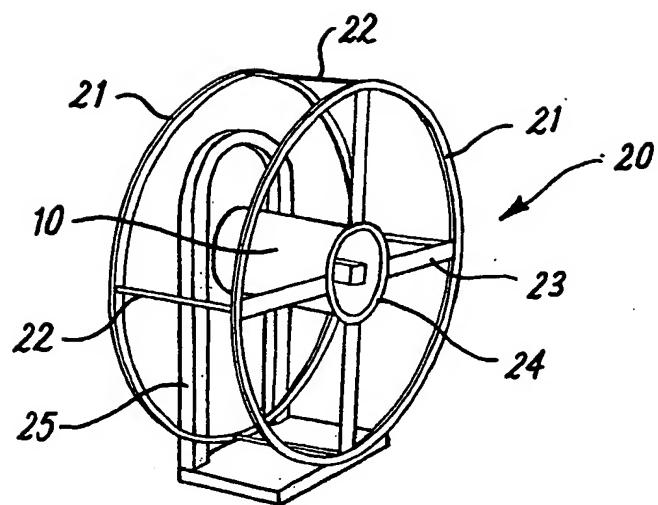


FIG. 3

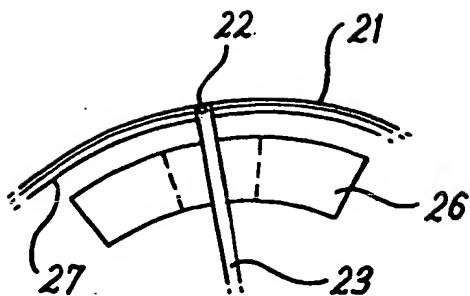


FIG. 4

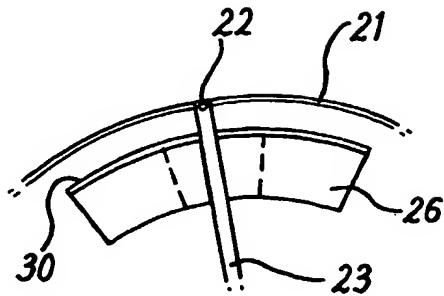


FIG. 5

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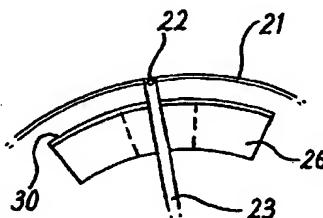
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(54) Title: DISPLAY DEVICE FOR REEL-BASED GAMING MACHINE



WO 2003/090005 A3

(57) **Abstract:** A display device for a player-operable entertainment machine has a rotatable reel (9) with symbols around its periphery. The symbols are defined digitally on a support (27, 30), such as a curved LCD strip, by feed of signals from a signal generating device (28). The support (27) may rotate with the reel. Alternatively the support (30) may be fixed so that the reel (9) rotates but the support (30) is static. In this case the support (30) extends round part only of the periphery of the reel and the feed of signals is such as to define symbols which move with the rotation of the reel (9).

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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category ^o	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Date of the actual completion of the International search

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